

WHAT IS CLAIMED IS:

- 1 1. A method for managing requests to an Input/Output (I/O) device,
2 comprising:
3 queuing I/O requests directed to the I/O device;
4 determining whether a number of queued I/O requests exceeds a threshold;
5 if the number of queued I/O requests exceeds the threshold, then calculating a
6 coalesce limit;
7 coalescing a number of queued I/O requests not exceeding the calculated coalesce
8 limit into a coalesced I/O request; and
9 transmitting the coalesced I/O request.

- 1 2. The method of claim 1, wherein the calculated coalesce limit dynamically
2 varies based in part on the number of queued I/O requests.

- 1 3. The method of claim 2, wherein calculating the coalesce limit includes
2 dividing the number of queued I/O requests by an interval.

- 1 4. The method of claim 1, wherein coalescing the queued I/O requests
2 comprises:
3 determining a maximum number of queued I/O requests up to the coalesce limit
4 that are directed to data stored at sequential locations, wherein the determined I/O
5 requests are coalesced into the coalesced I/O request, and wherein all the coalesced I/O
6 requests are directed to data stored at sequential locations.

- 1 5. The method of claim 1, wherein I/O requests are queued in a first queue or
2 a second queue, wherein determining whether the number of queued I/O requests exceeds
3 the threshold comprises determining whether a number of I/O requests in the second
4 queue exceeds the threshold, and wherein coalescing the number of queued I/O requests
5 comprises coalescing I/O requests from the first queue.

1 6. The method of claim 5, further comprising:
2 adding the transmitted coalesced I/O request to the second queue.

1 7. The method of claim 5, wherein the first queue is maintained by a device
2 driver in a computer memory and the second queue is implemented in a controller of the
3 I/O device.

1 8. The method of claim 7, wherein the controller comprises a storage
2 controller and the I/O device comprises a storage device.

1 9. The method of claim 5, further comprising:
2 determining whether there are at least two I/O requests in the first queue after
3 determining that the number of requests in the second queue exceeds the first queue,
4 wherein I/O requests from the first queue are only coalesced if there are at least two I/O
5 requests in the first queue.

1 10. The method of claim 1, further comprising:
2 transmitting one I/O request from the queue if the number of queued I/O requests
3 does not exceed the threshold.

1 11. A system for managing requests to a storage device, wherein a storage
2 controller manages access to the storage device, comprising:
3 a processor;
4 a memory device accessible to the processor; and
5 a device driver executed by the processor, wherein the device driver when
6 executed causes operations to be performed, the operations comprising:
7 (i) queue I/O requests directed to the storage device in the memory device;
8 (ii) determine whether a number of queued I/O requests exceeds a
9 threshold;

- 10 (iii) if the number of queued I/O requests exceeds the threshold, then
11 calculating a coalesce limit;
12 (iv) coalescing a number of queued I/O requests not exceeding the
13 calculated coalesce limit into a coalesced I/O request; and
14 (v) transmitting the coalesced I/O request.

1 12. The system of claim 11, wherein the calculated coalesce limit dynamically
2 varies based in part on the number of queued I/O requests.

1 13. The system of claim 12, wherein calculating the coalesce limit includes
2 dividing the number of queued I/O requests by an interval.

1 14. The system of claim 11, wherein coalescing the queued I/O requests
2 comprises:
3 determining a maximum number of queued I/O requests up to the coalesce limit
4 that are directed to data stored at sequential locations, wherein the determined I/O
5 requests are coalesced into the coalesced I/O request, and wherein all the coalesced I/O
6 requests are directed to data stored at sequential locations.

1 15. The system of claim 11, further comprising:
2 a first queue in the memory device, wherein the storage controller includes a
3 second queue, wherein determining whether the number of queued I/O requests exceeds
4 the threshold comprises determining whether a number of I/O requests in the second
5 queue exceeds the threshold, and wherein coalescing the number of queued I/O requests
6 comprises coalescing I/O requests from the first queue.

1 16. The system of claim 15, wherein the operations performed when executing
2 the device driver further comprise:

3 determine whether there are at least two I/O requests in the first queue after
4 determining that the number of requests in the second queue exceeds the first queue,
5 wherein I/O requests from the first queue are only coalesced if there are at least two I/O
6 requests in the first queue.

1 17. The system of claim 11, wherein the operations performed when executing
2 the device driver further comprise:

3 transmit one I/O request from the queue if the number of queued I/O requests
4 does not exceed the threshold.

1 18. An article of manufacture for managing requests to an Input/Output (I/O)
2 device, wherein the article of manufacture causes operations to be performed, the
3 operations comprising:

4 queuing I/O requests directed to the I/O device;
5 determining whether a number of queued I/O requests exceeds a threshold;
6 if the number of queued I/O requests exceeds the threshold, then calculating a
7 coalesce limit;
8 coalescing a number of queued I/O requests not exceeding the calculated coalesce
9 limit into a coalesced I/O request; and
10 transmitting the coalesced I/O request.

1 19. The article of manufacture of claim 18, wherein the calculated coalesce
2 limit dynamically varies based in part on the number of queued I/O requests.

1 20. The article of manufacture of claim 19, wherein calculating the coalesce
2 limit includes dividing the number of queued I/O requests by an interval.

1 21. The article of manufacture of claim 18, wherein coalescing the queued I/O
2 requests comprises:

3 determining a maximum number of queued I/O requests up to the coalesce limit
4 that are directed to data stored at sequential locations, wherein the determined I/O
5 requests are coalesced into the coalesced I/O request, and wherein all the coalesced I/O
6 requests are directed to data stored at sequential locations.

1 22. The article of manufacture of claim 18, wherein I/O requests are queued in
2 a first queue or a second queue, wherein determining whether the number of queued I/O
3 requests exceeds the threshold comprises determining whether a number of I/O requests
4 in the second queue exceeds the threshold, and wherein coalescing the number of queued
5 I/O requests comprises coalescing I/O requests from the first queue.

1 23. The article of manufacture of claim 22, wherein the operations further
2 comprise:

3 adding the transmitted coalesced I/O request to the second queue.

1 24. The article of manufacture of claim 22, wherein the first queue is
2 maintained by a device driver in a computer memory and the second queue is
3 implemented in a controller of the I/O device.

1 25. The article of manufacture of claim 24, wherein the controller comprises a
2 storage controller and the I/O device comprises a storage device.

1 26. The article of manufacture of claim 22, wherein the operations further
2 comprise:

3 determining whether there are at least two I/O requests in the first queue after
4 determining that the number of I/O requests in the second queue exceeds the first queue,

5 wherein I/O requests from the first queue are only coalesced if there are at least two I/O
6 requests in the first queue.

1 27. The article of manufacture of claim 18, wherein the operations further
2 comprise:
3 transmitting one I/O request from the queue if the number of queued I/O requests
4 does not exceed the threshold.